

## **REMARKS/ARGUMENTS**

Reconsideration of this application is requested. Claims 1-15, 18-24, 27 and 29 are in the case.

### **I. THE INTERVIEW**

At the outset, the undersigned wishes to thank the Examiner (Ms. Hindenlang) and her supervisor (Mr. Tucker) for kindly conducting an interview in this case. The interview was held on August 3, 2010, and courtesies extended by the Examiner and her supervisor were most appreciated. The substance of the interview will be clear from the Interview Summary and the comments presented below.

### **II. THE ANTICIPATION REJECTION**

Claims 15, 17-24, 27 and 29 are rejected under 35 U.S.C. §102(b) as allegedly anticipated by Carlier (US 6,271,272) as evidenced by Harclerode (US 5,240,657). The rejection is respectfully traversed.

As discussed during the interview, claim 15 as amended claims pre-expanded beads having a bulk density chosen from a range of from 40 to 190 g/l. Following the interview, the Applicants have decided to amend claim 15 to further define certain of the constituents. Subject matter deleted from the claims is without prejudice to pursuing that subject matter in a separate continuing application. As now claimed, the pre-expanded beads contain by weight (a) 100 parts of a polymer of styrene having a mean molecular mass by weight  $M_w$  chosen from a range of from 180,000 to 250,000 and a molecular weight distribution calculated by the ratio of  $M_w$  to the mean molecular mass

by number,  $M_n$ , in the range of from 2.1 to 2.5, (b) from 0.5 to less than 3.0 parts of at least one blowing agent, (c) from 0 to 0.4 part of at least one plasticising agent comprising an oil which is liquid at 20°C, having on average from 25 to 38 carbon atoms, a dynamic viscosity at 25°C of from 110 to 170mPa.s and a density of from 0.8 to 0.9, and (d) less than 400ppm of residual styrene monomer. The pre-expanded beads are expandable.

Referring to Carlier, it is noted at the outset that Carlier employs a relatively high amount of both blowing agent and plasticising agent. The lowest amount of blowing agent is Carlier's Example F, which is nearly 50% higher than the 0.5 to less than 3.0 parts range as presently claimed.

In addition, Carlier distinguishes between the situation where large amounts (6.5-9pbw) of blowing agent are used and where smaller amounts of blowing agent are used (3-6.5pbw). Carlier is in effect saying that if the amount of blowing agent is to be reduced, then it is necessary to increase the amount of plasticising agent (i.e., wax). Carlier mentions a wax level of at least 0.1%. The exemplified levels are much higher. Moreover, as exemplified, Carlier uses a solid paraffin wax.

The presently claimed invention on the other hand employs an oil which is liquid at 20°C, and has on average from 25 to 38 carbon atoms, a dynamic viscosity at 25°C of from 110 to 170mPa.s and a density of from 0.8 to 0.9. This feature is not disclosed by Carlier.

Carlier, furthermore, stops polymerisation of the styrene at a relatively high monomer level. According to Carlier (col. 10 and 11), polymerisation can be continued until monomer level is 2000ppm to "even less than 600ppm." Carlier clearly regards

600ppm as very close to the limit. This is supported by the examples where Carlier ceases polymerisation at 750ppm.

In the presently claimed invention, in contrast, the polymerisation is longer and hotter in accordance with the examples of the invention than in accordance with the examples of Carlier, and results in 200ppm of monomer. It is well known that the length and time of polymerisation reaction results in different polymers. The total reaction conditions giving rise to only 200ppm of polymer are clearly different from those giving rise to 750ppm. One of the effects on changed polymerisation conditions is likely to be that the molecular weight distribution (in other words the ratio of average molecular weight  $M_w$  to number average molecular  $M_n$ ) is changed.

It has been found that in accordance with the invention that by using a plasticiser which is liquid at 20°C, having on average from 25 to 38 carbon atom, a dynamic viscosity at 25°C of from 110 to 170mPa.s and a density of from 0.8 to 0.9, a styrene polymer with an average molecular weight  $M_w$  in the range 180,000 to 250,000, a molecular weight distribution in the range of from 2.1 to 2.5 and a residual monomer content of less than 400ppm is obtained. Moreover, directly contrary to Carlier, a combination of both low plasticiser level and low blowing agent can be achieved.

In light of the above, it is clear that Carlier does not disclose the presently claimed pre-expanded expandable beads having, in combination, the features of (1) a bulk density chosen from a range of from 40 to 190 g/l, (2) 100 parts of a polymer of styrene having a mean molecular mass by weight  $M_w$  chosen from a range of from 180,000 to 250,000 and a molecular weight distribution calculated by the ratio of  $M_w$  to the mean molecular mass by number,  $M_n$ , in the range of from 2.1 to 2.5, (3) from 0.5 to

less than 3.0 parts of at least one blowing agent, (4) from 0 to 0.4 part of at least one plasticising agent comprising an oil which is liquid at 20°C, having on average from 25 to 38 carbon atoms, a dynamic viscosity at 25°C of from 110 to 170mPa.s and a density of from 0.8 to 0.9, (5) less than 400ppm of residual styrene monomer, and (6) where the pre-expanded beads are expandable.

. Carlier is therefore not anticipatory of claim 15. Claims 18-24, 27 and 29 are all dependent on claim 15, and they too are not anticipated by Carlier. Withdrawal of the anticipation rejection based on Carlier is respectfully requested.

### **III. THE OBVIOUSNESS REJECTION**

Claim 28 is rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Carlier and further in view of Harclerode. In response, and without conceding to the rejection, claim 28 has been canceled without prejudice. Withdrawal of the obviousness rejection is respectfully requested.

### **IV. AMENDMENTS**

Claim 15 paragraph (a) has been amended to specify that the polymer of styrene has a mean molecular mass by weight  $M_w$  chosen from a range of from 180,000 to 250,000 and a molecular weight distribution calculated by the ratio of  $M_w$  to the mean molecular mass by number,  $M_n$ , in the range of from 2.1 to 2.5. Support for the range of 180,000 to 250,000 appears in the specification for example at page 6, line 27. Support for the  $M_n$ , range of from 2.1 to 2.5 is to be found in the specification at for example page 6, line 30.

Claim 15 paragraph (c) has been amended to specify that the plasticising agent comprises an oil which is liquid at 20°C, having on average from 25 to 38 carbon atoms, a dynamic viscosity at 25°C of from 110 to 170mPa.s and a density of from 0.8 to 0.9. Support for the oil appears in the specification at for example page 8, lines 4-5. Support for the average from 25 to 38 carbon atoms, the dynamic viscosity at 25°C of from 110 to 170mPa.s and the density of from 0.8 to 0.9 appears in the specification at for example page 8, lines 8-10. Claim 15 has been further amended to include a paragraph (d) reciting less than 400ppm of residual styrene monomer, support for which appears in the specification at for example page 6, line 33. No new matter is entered.

Favorable action is awaited.

Respectfully submitted,

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